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# Consistent-Shape Fogging Defects in SGP Laminated Glass: Diagnosis and Autoclave Correction

## A veil that repeats is trying to tell you something

Most optical complaints in laminated glass are irregular: a dust point here, a fingerprint there, a bubble that follows no particular map. A different pattern deserves a different diagnosis. When every pane in a batch shows a fog-like defect in the same place, with a nearly identical outline, the fault is almost never a random contaminant on a single lite. The repeating shape is a process signature.

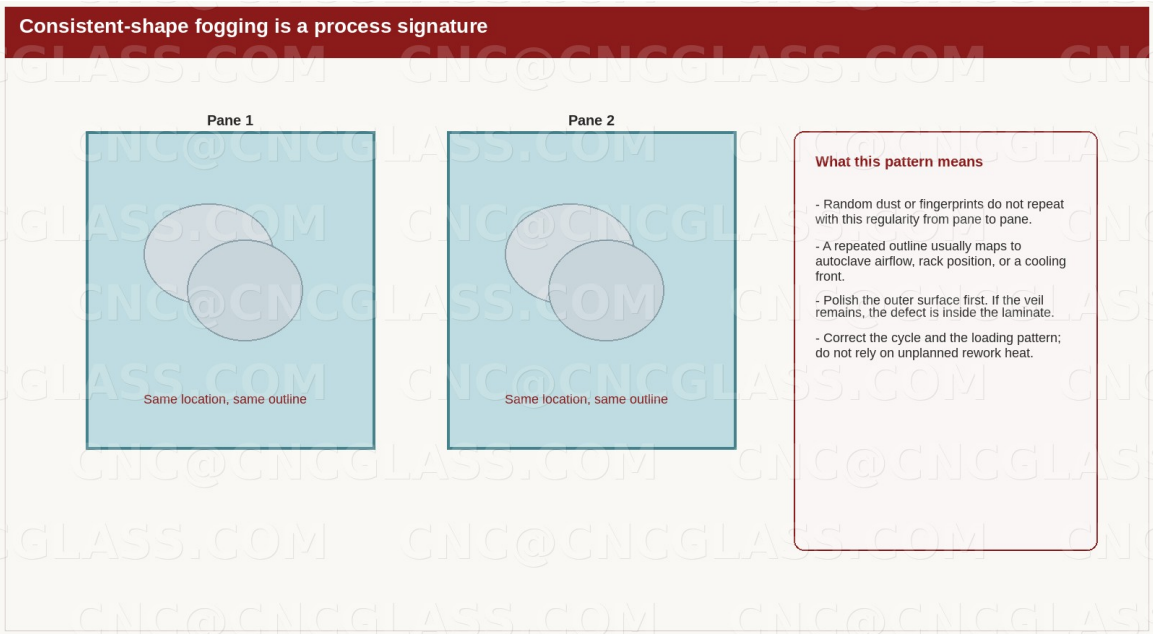



*Figure 1. When a fog-like veil repeats in the same place and with the same outline from pane to pane, the pattern is a process signature, not random dirt.*

A first, simple check is to polish the outer glass. If the veil disappears, the problem was on the surface. If it remains, the scatter sits inside the laminate. At that point, rework heat applied without a diagnosis only spends time. The autoclave cycle and the way the glass is loaded are the usual places to look, especially with ionoplast (SGP) packs that need a full thermal and pressure hold.

## What drives a regular internal fog

Internal fogging of this kind is closely tied to processing temperature, hold time, cooling rate, how many plates are in the chamber, and how they are spaced. Air and steam must move across every face. If plates are stacked with almost no gap, dead zones form. Those dead zones can leave a standing pattern of residual moisture or volatiles that later appears as a milky patch of a consistent shape, often related to rack position or to the cooling front.

Cooling rate is the other frequent cause. A sluggish cool-down gives residual moisture and volatiles time to redistribute inside the pack before the bond is fully locked. An adequately rapid, controlled cooling rate, together with open rack spacing, is one of the most reliable preventions we know. The exact set-points belong to the equipment and the stack, but the principle is stable: do not linger in the temperature band where haze can develop, and do not starve the chamber of circulation.

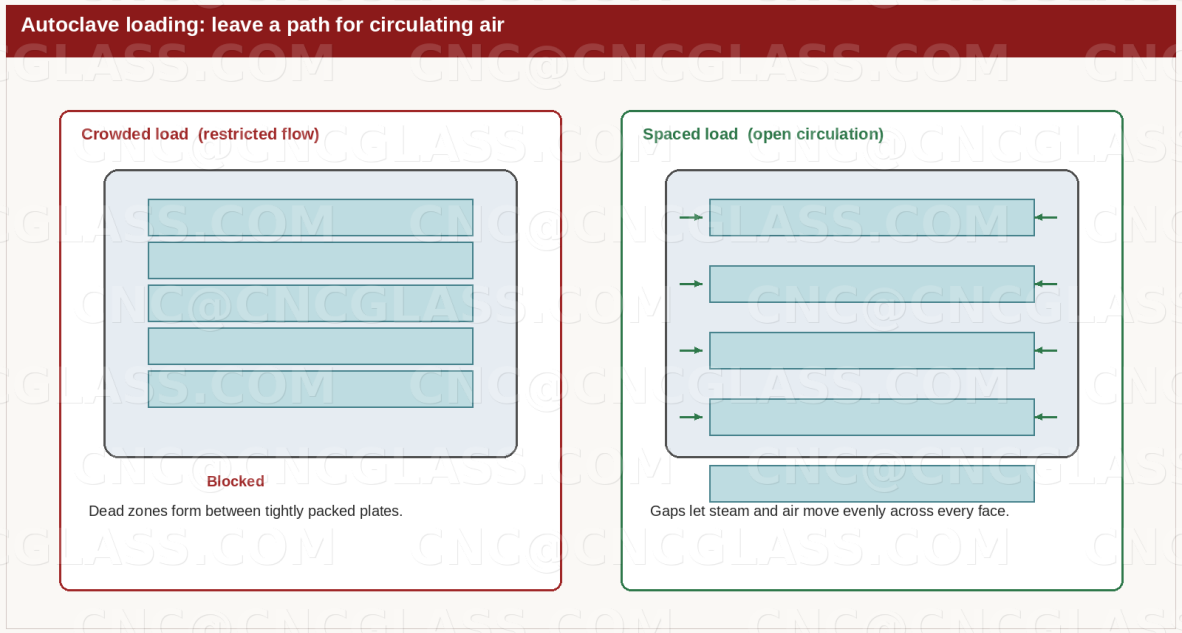



*Figure 2. Autoclave loading compared: a crowded rack creates airflow dead zones, while a spaced load lets circulating air reach every face.*

## Correct the cycle; then rework with intent

When a batch already shows the repeated veil and delivery is tight, the useful path is not a blind second heat. Adjust the autoclave parameters and the loading pattern first, then run a refined re-process on the defective plates. In practice this means opening the gaps on the rack so air can circulate, confirming that the hold temperature and time are appropriate for the ionoplast stack, and imposing a cooling rate that is fast enough to avoid a second veil.

Done this way, a salvageable batch can be brought back to a clear, inspectable standard without replacing the glass. Done as an unplanned extra cycle with the same crowded load and the same slow cool, the defect often returns in the same outline, which is itself a confirmation that the pattern is process-driven.

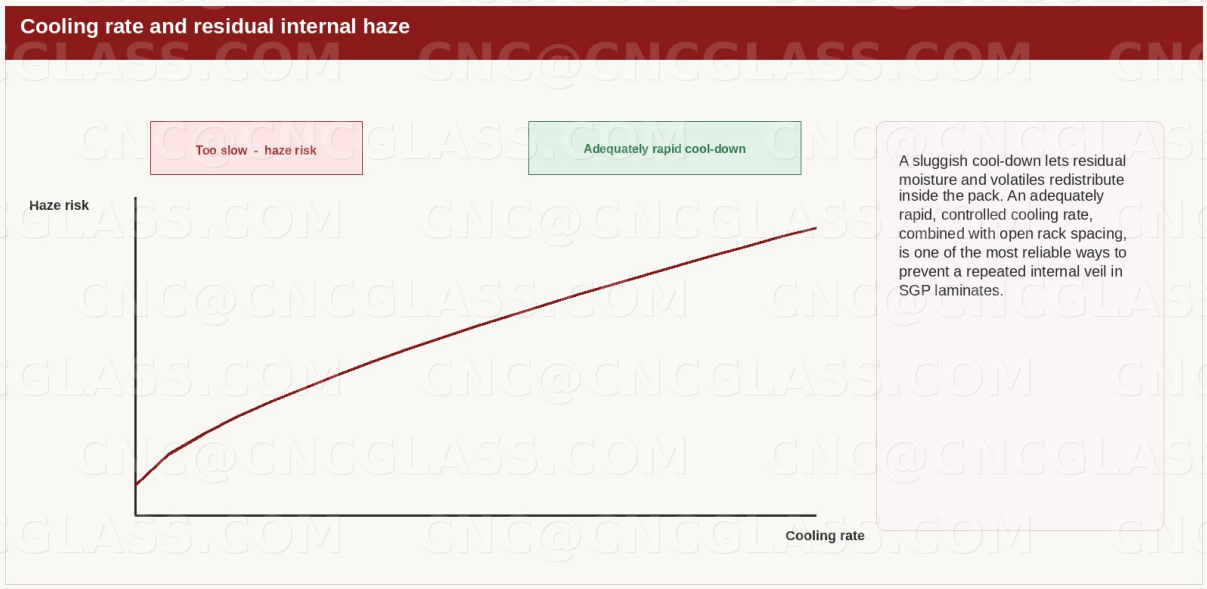



*Figure 3. Haze risk falls as the cool-down becomes adequately rapid and controlled. A sluggish cool is a frequent cause of a repeated internal veil.*

## Two shop-floor rules that prevent most cases

Leave sufficient gaps when loading so that circulation inside the autoclave is not blocked. Treat spacing as a quality setting, not as a way to squeeze one more plate into a shift. And control the cool-down so that it is adequately rapid and repeatable, rather than leaving the chamber to drift. Those two disciplines, plus a verified hold, prevent the majority of consistent-shape internal fogging we are asked to review.

The wider lesson is that SGP lamination quality is decided as much by how the autoclave is used as by the film that went into the pack. Interlayer supply and process control have to travel together. A clear ionoplast laminate is the product of both.

A fog that repeats in the same shape on every pane is a map of the autoclave, not a mystery in the glass. Confirm that the veil is internal, open the load for circulation, set a proper hold, and cool at a controlled, adequately rapid rate. Rework only after those corrections are in place. That is how a tight delivery can still be met without repeating the same defect.

## Contact Us

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*If a batch of ionoplast laminates shows a repeated internal veil, we can help review loading, hold, and cooling practice and suggest a controlled rework path.*